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Social Justice and Inclusion in Education for Sustainable Development: Bibliometric and Thematic Mapping in 2015-2026

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ABSTRACT

Background: Education for sustainable development (ESD) intersects with equity, inclusion and justice, but the frequency of related vocabulary does not itself establish substantive educational change. Objective: This study maps the bibliographic and abstract-level conceptual landscape of social justice and inclusion in ESD research indexed in Scopus from 2015 to 11 October 2026. Methods: Two Scopus exports were reconciled by EID and DOI to produce 2,215 articles and reviews. Annual production, source distribution and normalized author-keyword networks were examined. A prespecified dual-vocabulary screen identified 188 records with explicit ESD and justice/inclusion language in titles or abstracts; four overlapping justice dimensions and four educational contexts were mapped using reproducible lexical indicators. Results: Annual production rose from 26 records in 2015 to 525 in 2025; 2026 is incomplete. Four communities were detected in the broad 51-node keyword network. Within 188 lexical candidates, equity/accessibility language appeared in 130, participation/agency in 52, environmental/climate justice in 35 and recognition/epistemic justice in 32 records. Conclusion: Mapping reveals differentiated vocabularies linking justice with sustainability-oriented pedagogy and educational policy. Findings describe bibliographic and lexical patterns, not verified educational outcomes or a completed full-text systematic review.

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1. INTRODUCTION

Education for sustainable development (ESD) must confront interdependent ecological, social and economic challenges while also addressing who can access sustainability learning, whose knowledge counts, and who participates in decisions about collective futures. Bibliometric overviews help identify the structure and trajectory of this research, but a field can appear inclusive through terminology without providing strong evidence of educational justice in practice. Earlier maps have established the breadth of ESD research, including school and higher-education perspectives (Hallinger & Nguyen, 2020; Tafese & Kopp, 2025). A justice-centred account requires attention to the links among ESD vocabulary, educational subjects, pedagogical practices and power-sensitive claims.

The intellectual challenge is not to establish whether the words “justice” or “inclusion” occur in sustainability-related records. Rather, it is to understand how educational researchers place these ideas in relation to environmental learning, knowledge recognition, access to resources and participatory governance. Critical analyses of ESD question the social assumptions of sustainable development and the limits of market-oriented models (Kopnina & Cherniak, 2016; Tikly, 2019). In parallel, research on place-based Indigenous curricula and teacher practice connects sustainability learning to situated knowledge, participation and climate justice (Li & Shein, 2023; Rushton et al., 2026).

The present study takes its analytical architecture from a complementary bibliometric-and-reproducible lexical approach rather than attempting to infer educational outcomes directly from co-word networks. For comparison, the review by Wang et al. (2024) used bibliometric analysis on 2,223 records and separate content analysis on 125 papers. The essential transferable principle is that large-scale science mapping identifies structures, while closer reading interrogates educational substance. Our available SuER-02 data support a complete metadata-level analysis and a structured title/abstract-based thematic stage; they do not yet support claiming full-text synthesis or independently adjudicated study inclusion.

The study addresses four questions: RQ1, what is the 2015–2026 publication profile of the Scopus retrieval? RQ2, which author-keyword communities structure the corpus, and how does a focused justice–ESD vocabulary subset compare?

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RQ3, which justice dimensions, pedagogical objects, methodological labels and educational contexts appear in targeted abstracts? RQ4, what do the observed patterns imply for a theory-informed research agenda in inclusive sustainability education, without treating keyword presence as demonstrated educational impact?

1.1. Review landscape and analytical positioning

Prior bibliometric scholarship already maps ESD broadly, including higher education and sector-specific trends (Hallinger & Nguyen, 2020; Tafese & Kopp, 2025; Fayda-Kinik, 2025). More narrowly focused work examines equity and representation in sustainability education in the Global South (Al Mubarok et al., 2026), while reviews and institutional case accounts address inclusive basic education and higher-education practice (Chunga et al., 2026; Viviani, 2022). Recent conceptual scholarship also raises epistemic-justice issues in sustainability education (Tosetto et al., 2026). SuER-02 therefore does not claim that justice-oriented sustainability education was previously unstudied. Its intended contribution is a transparent comparison of broad author-keyword structures against a specifically justice-sensitive title/abstract corpus, followed by a crosswalk between justice language and educational objects. Co-occurrence, thematic salience and educational effectiveness are different empirical propositions.

2. METHOD

2.1. Design, source and search coverage

This study combines bibliometric performance analysis, author-keyword science mapping and structured title/abstract lexical analysis. Scopus was the sole database for record identification. Two Scopus Advanced Search strategies were supplied by the researcher: the broad retrieval (Q1; export n = 2,176) and the focused ESD–justice retrieval (Q2; researcher-confirmed 383 documents found). Both were limited to journal articles and reviews published from 2015 to 2026 and were exported on 11 October 2026. The full verbatim search expressions, including Scopus proximity operators and publication limits, are documented in Appendix A (A.1–A.2). Query-to-export attribution relies on the researcher-provided search history; the exported CSV metadata alone do not preserve the executed Boolean strings. The frozen merged exports, not newly constructed searches, form the analytical corpus. The bibliometric procedure follows general principles in (Donthu et al., 2021) and the methods embodied in bibliometrix (Aria & Cuccurullo, 2017).

The broad Q1-associated export contained 2,176 records and the researcher-confirmed focused Q2 export contained 383. There were 342 shared Scopus EIDs, giving 2,217 EID-unique entries. Two further DOI collisions across different EIDs were removed during the earlier reconciliation, yielding 2,215 bibliographic records (2,030 articles; 185 reviews). The two DOI-collision pairs were checked against publisher and bibliographic records; both duplicate EIDs referred to single published works with incorrect source labels in one Scopus entry. The retained records correspond to the verified publication sources (Appendix B). This reconciliation is not a PRISMA flow of content-eligible studies, as topical screening and full-text eligibility were not completed for the full set.

2.2. Metadata, reproducibility and quality safeguards

Fields inspected include Scopus EID, DOI, authors, title, publication year, source title, document type, abstract, author keywords, indexed keywords, cited-by values and cited references. Eighty-six records (3.88%) lack DOI, 97 (4.38%) lack author keywords, and 10 (0.45%) lack reference strings; abstracts are available for all 2,215 records. The Biblioshiny missing-data export additionally showed that indexed keywords (ID) were missing for 1,513 records (68.31%). For that reason, primary co-word analyses were restricted to author keywords (DE), not a combined ID+DE field; 100% missing Web of Science categories is not an error for this Scopus export.

Titles of publication sources were whitespace-normalized for descriptive reporting, so 929 distinct raw source strings reduce to 926 distinct normalized strings. Biblioshiny previously reported 928 source labels using its own import rules; both values are accompanied by their data-processing definition, rather than treated as interchangeable. The 2026 publishing year is incomplete and annual-rate conclusions are therefore anchored to complete years through 2025.

2.3. Keyword processing and network analysis

Author keywords were separated by semicolons, converted to lowercase, trimmed and deduplicated within each record. A documented dictionary merges unambiguous variants, notably “ESD,” “education for sustainability” and “sustainability education” into “education for sustainable development,” and several standard SDG variants into a common term. Equity and equality were deliberately not collapsed, as they make different normative claims. Common search-driven hubs (“sustainability,” “education,” etc.) were removed only from network visualizations to prevent them from obscuring specialized relationships; their raw occurrence remains visible in the frequency summary.

An undirected weighted graph was formed using the count of records containing both author keywords as the edge weight. For the full corpus we considered the 52 most frequent eligible keywords occurring at least nine times, retaining edges with at least three co-mentions; isolated nodes were excluded. A parallel network was built from a targeted subset using the 50 most frequent eligible terms appearing at least four times, with a minimum edge frequency of one. Communities were estimated using weighted greedy modularity, and figures use a fixed-seed force-directed layout. These are Python/NetworkX calculations on the Scopus export, not a claim that their clusters were computed by Biblioshiny or VOSviewer. The specified parameters, dictionary and script are retained for replication; alternative thresholds should be tested before a final network-based interpretation is fixed. For methodological comparison, VOSviewer provides an

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established visualization approach (van Eck & Waltman, 2010), although the figures in this study were computed using the archived Python/NetworkX procedure.

2.4. Targeted selection and abstract-level categories

A reproducible two-concept screen was applied to titles and abstracts (not the indexed-keyword field). One expression searched for explicit ESD/sustainability-education phrases, including education for sustainable development, education for sustainability, sustainability education, learning for sustainability and environmental education. The second searched for explicit justice or inclusion terminology, including social justice, educational equity, inclusive education, social inclusion, environmental/climate justice, gender equality, decolonial education and Indigenous education. Both patterns had to match to flag a candidate. This produced 188 records. They are lexical candidates, not 188 independently screened or full-text-included studies; the exact regular expressions are included in the analysis script.

Following the categorical review logic described by Wang et al. (2024), the targeted abstracts were mapped through non-exclusive lexical indicators covering four justice dimensions: equity/accessibility; recognition/epistemic justice; participation/agency; and environmental/climate justice. Further indicators identified curriculum and teaching, education policy, teacher preparation and community-based practices. Lexical method and education-stage indicators were counted separately. Multiple categories per abstract were allowed; absence of a term was not treated as evidence that a practice or theory was absent. These data are lexical indicators, not manually adjudicated full-text content codes.

2.5. Ethics and interpretive rules

The study uses bibliographic metadata and published abstracts, with no recruitment of human participants. The analysis refrains from presenting citations, country of affiliation, keyword centrality or statistical trends as measures of social justice outcomes. Only study-specific conclusions directly supported by the available abstract are used as contextual examples. Any eventual full-text qualitative synthesis will require accessible papers, independent relevance decisions, documented coding disagreements and checks against the relevant texts.

Table 1. Search reconciliation and quality checks for the analytical dataset.

Audit dimension	Record count / status	Interpretation
Broad Scopus retrieval (Q1)	2,176	Broad Boolean supplied by researcher; 2,176-row export
Focused Scopus retrieval (Q2)	383	383 documents found; researcher-confirmed search count
EID overlap	342	Present in both source sets
EID-unique records	2,217	After direct EID comparison
Additional DOI collisions removed	2	Cross-EID duplicates; check source records
Final metadata corpus	2,215	Bibliometric denominator
Title/abstract vocabulary candidates	188	Not yet full-text inclusion
Missing DOI / DE / cited references	86 / 97 / 10	3.88% / 4.38% / 0.45%

3. RESULTS

3.1. Publication development and distribution

The 2,215-record corpus comprises 2,030 journal articles (91.65%) and 185 reviews (8.35%). Production rose from 26 records in 2015 to 525 in 2025, approximately a 20-fold increase over complete calendar years. The rise accelerated from 281 records in 2024 to 525 in 2025 (86.8% increase). The export contains 657 records dated 2026, but this is a partially indexed year and is plotted separately without annualizing or extrapolating its value (Figure 1). These numbers describe the retrieval corpus as defined by the search terms, not a quality-adjusted count of studies on justice.

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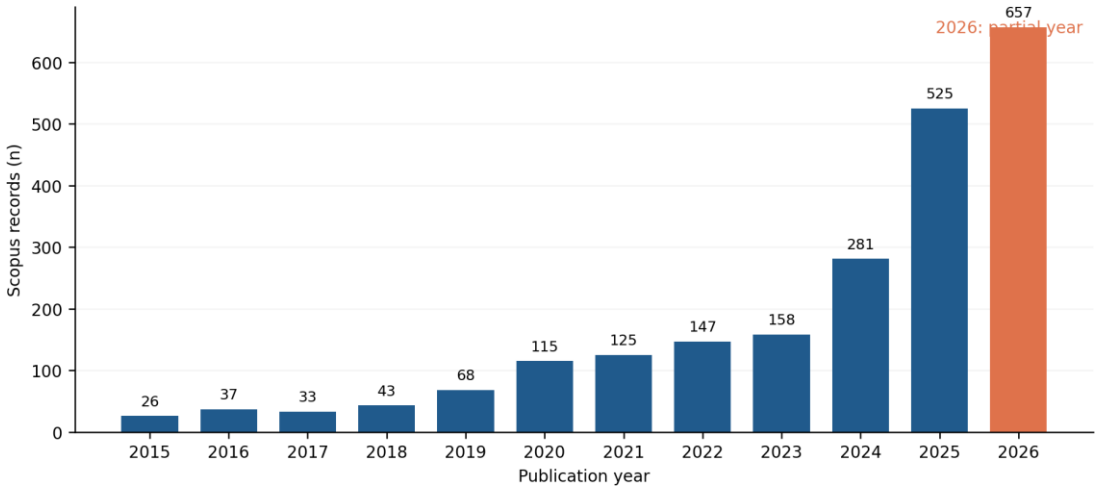


Figure 1. Annual scientific production in the Scopus retrieval, 2015–2026 (n = 2,215).

Publication concentration is substantial. After source-title whitespace normalization, Sustainability (Switzerland) contributes 360 records, followed by International Journal of Sustainability in Higher Education (57), Frontiers in Education (54) and Education Sciences (36; Figure 2). This distribution confirms that the search captures multiple sustainability and education outlets, but concentration in a particular journal does not establish conceptual representativeness or the strength of its evidence.

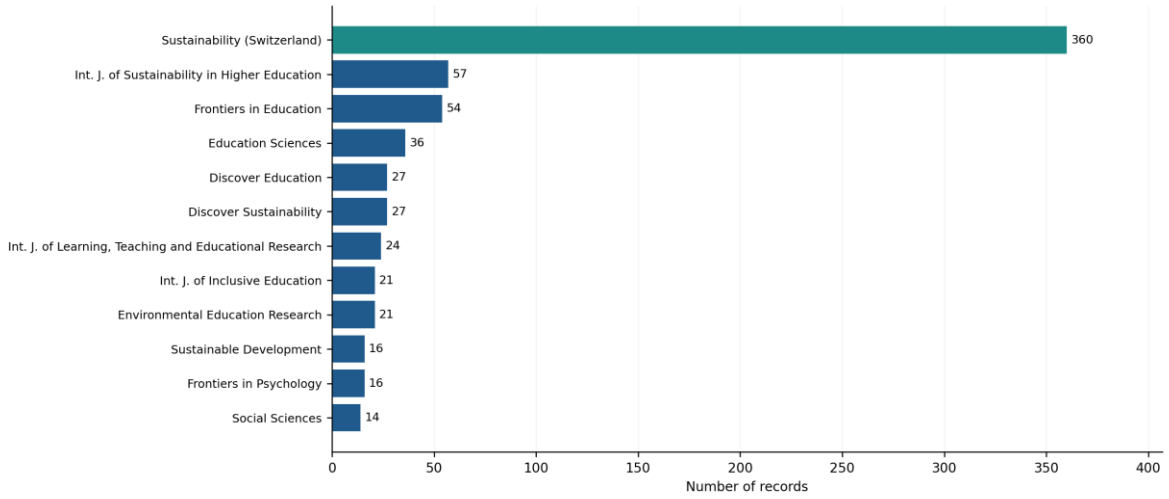


Figure 2. Twelve largest publication sources in the frozen Scopus corpus. Source names were whitespace-normalized; publisher/journal name variants were not otherwise conflated.

3.2. Author-keyword landscape and intellectual structure

The imported records contain 6,258 distinct unnormalized author-keyword strings (Biblioshiny output). After documented synonym merging and within-record deduplication, high-frequency descriptors include education for sustainable development (266 records), higher education (237), sustainable development goals (214), inclusive education (149), artificial intelligence (73), social justice (61), gender equality (51), Indigenous knowledge (47) and educational equity (43). Figure 3 omits several generic labels only to improve visibility; the cleaning log retains all raw term frequencies. Keyword frequency reflects how authors describe their work, not the number of studies demonstrating a specific pedagogical effect.

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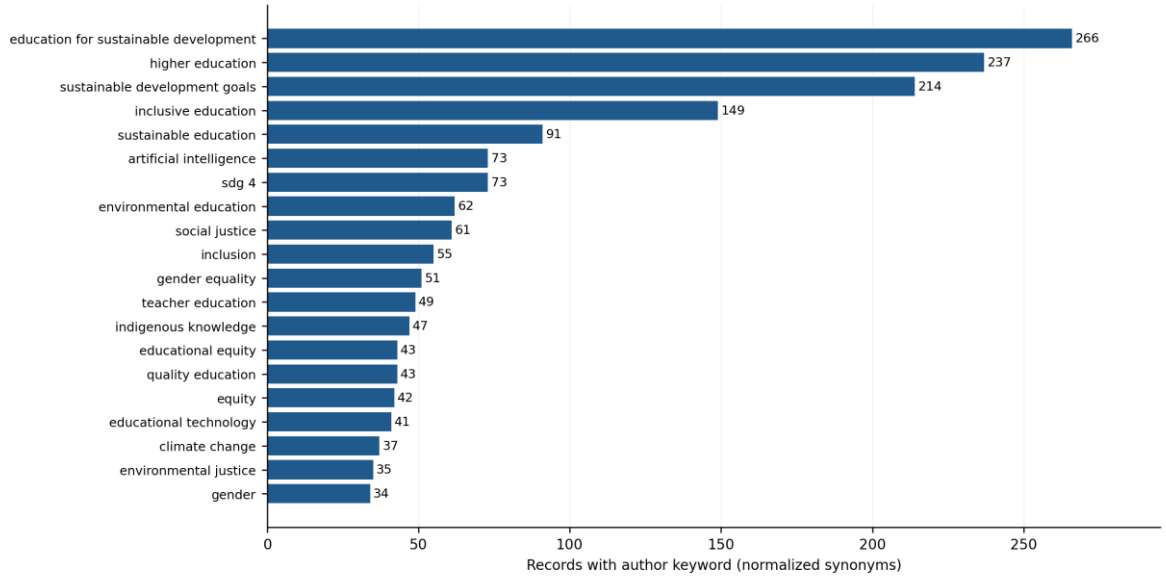


Figure 3. Frequent author-keyword descriptors after explicitly documented synonym harmonization; generic terms excluded from this display only.

The broad co-occurrence graph contained 51 connected nodes and 151 retained edges, producing four algorithmic communities (Figure 4). One brought together higher education, the SDGs, gender equality and quality education; another joined ESD, environmental education, teacher education, Indigenous knowledge, social justice and environmental justice. A third linked inclusive education and educational equity with digital or AI-oriented educational terms, whereas a fourth grouped equity, inclusion, gender, teacher training and early childhood descriptors. These are post hoc descriptive labels based on the top terms in each community and should not be mistaken for an externally validated taxonomy.

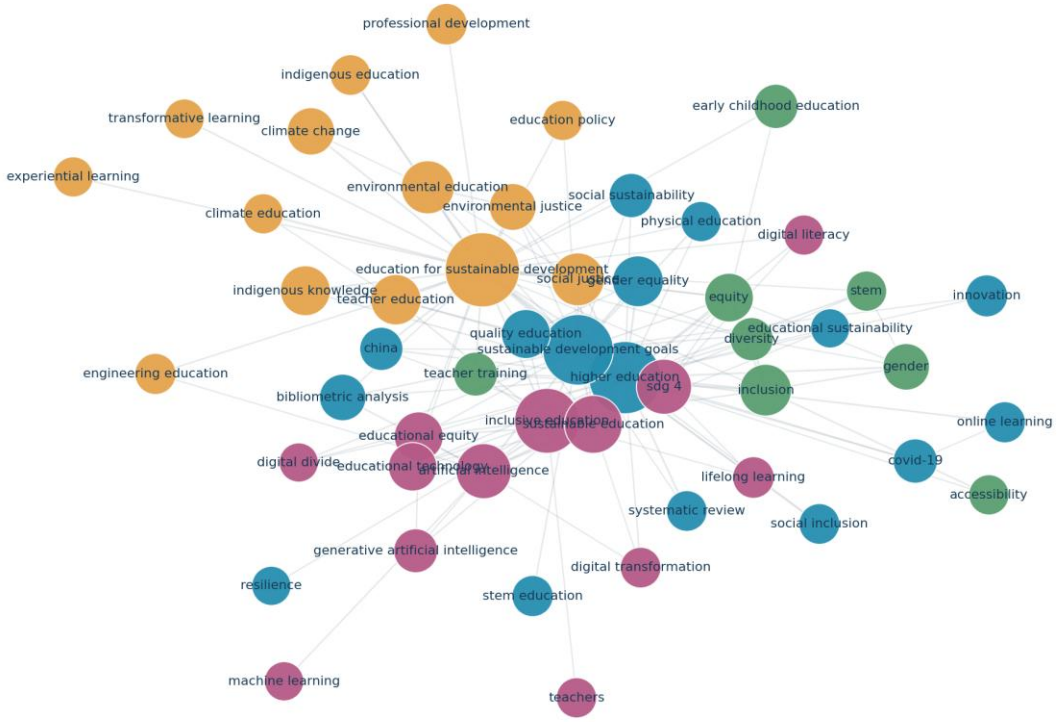


Figure 4. Author-keyword co-occurrence network for the entire bibliometric corpus. Weighted greedy-modularity groups, 51 nodes and 151 edges; graphical placement is indicative of co-mention structure, not causal or normative proximity.

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Table 2. Broad keyword-network communities from the 2,215-record dataset.

Community	Nodes	Indicative highest-frequency descriptors
1	16	higher education, sustainable development goals, gender equality, quality education, bibliometric analysis
2	14	education for sustainable development, environmental education, social justice, teacher education, indigenous knowledge
3	13	inclusive education, sustainable education, sdg 4, artificial intelligence, educational equity
4	8	inclusion, equity, gender, early childhood education, teacher training

The focused 188-record lexical candidate set generates a smaller graph because explicit ESD–justice texts do not use the entire broad corpus vocabulary at the frequency required for visualization. Its connected network contains 15 nodes and 36 edges and separates a core ESD/SDG/higher-education/social-justice community from an environmental-justice/education community and an inclusive-education/teacher-education community (Figure 5). This comparison is informative: a broad search dominated by general SDG and technology terms can appear conceptually richer than a narrowly targeted set, while the latter more clearly exposes linkages of direct interest to SuER-02.



Figure 5. Author-keyword co-occurrence network for 188 title/abstract lexical candidates. Weighted greedy modularity; 15 nodes and 36 edges. Candidate status is not equivalent to final content eligibility.

3.3. Explicit justice vocabulary in targeted abstracts

Among the 188 records explicitly matching both topic dictionaries, equity and accessibility vocabulary occurs in 130 abstracts (69.1%). Participation and agency vocabulary occurs in 52 (27.7%), environmental and climate justice vocabulary in 35 (18.6%) and recognition or epistemic-justice vocabulary in 32 (17.0%; Figure 6). These dimensions overlap: for example, a community-centred Indigenous educational study can simultaneously refer to recognition and participation. The categories are based on prespecified terms, so their relative counts express lexical prominence rather than coded depth or policy significance.

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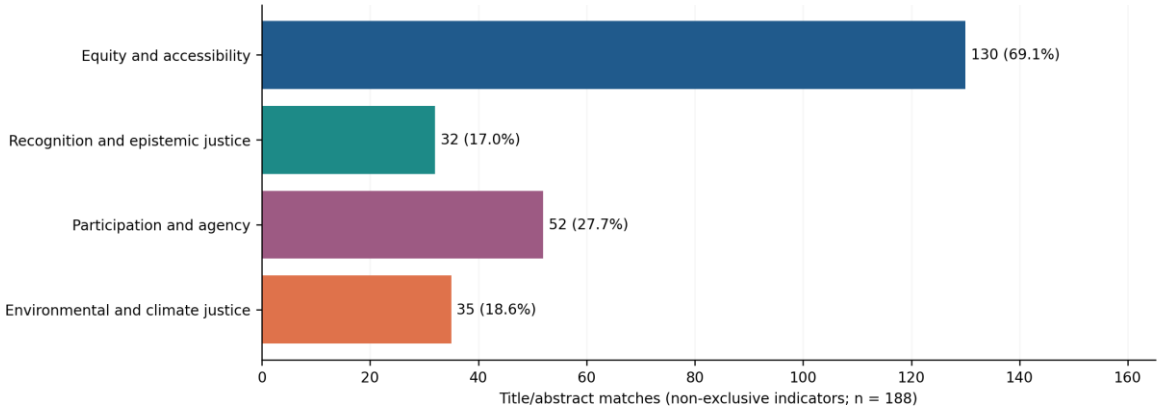


Figure 6. Non-exclusive lexical markers for four justice dimensions in the 188 title/abstract candidates. Percentages use 188 as denominator and must not be interpreted as frequencies of confirmed educational outcomes.

Indicators describing what the education research does are also unevenly distributed: curriculum, teaching and learning terminology appears in 135 records; policy/governance in 80; teacher education or professional learning in 41; and community/place-based practices in 29. At the method-vocabulary level, 60 abstracts mention qualitative evidence, 43 mention quantitative/survey evidence, 34 mention literature or bibliometric reviews, 10 mention mixed methods, and five mention design-based or participatory research. The patterns overlap and many abstracts do not clearly identify a research design; thus the values cannot be turned into a mutually exclusive methodological breakdown without independent full-text classification.

Period comparison shows that the lexical prominence of equity and accessibility varies from 45.0% of the 20 targeted records in 2015–2018 to 80.8% of the 52 records dated 2026. Recognition/epistemic terminology ranges from 5.0% in 2015–2018 to 26.9% in the partial 2026 set (Figure 7). These period percentages should be read cautiously because period sizes are small and the retrieval strategy may preferentially locate documents that use these terms. They show changing language within the targeted set, not independently verified conceptual shifts in the underlying field.

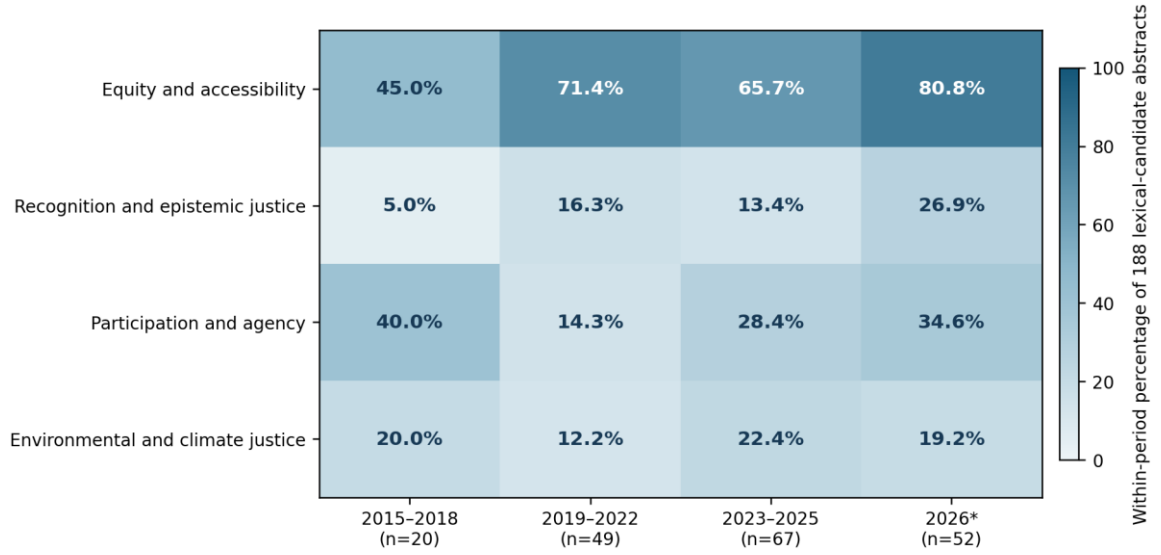


Figure 7. Temporal distribution of justice-related title/abstract indicators within the 188 lexical candidates (n by period shown). 2026 is incomplete; multi-label categories overlap.

A quantitative crosswalk connecting justice dimensions with explicitly named educational objects adds detail (Figure 8). Equity/accessibility co-occurs with curriculum/teaching terminology in 97 targeted abstracts and policy/governance terminology in 57; recognition/epistemic language co-occurs with community/place-based practice markers in 17. These are text-based links, not evidence of effective implementation. They nevertheless offer a transparent route from the large co-word map toward specific educational questions that warrant closer review.

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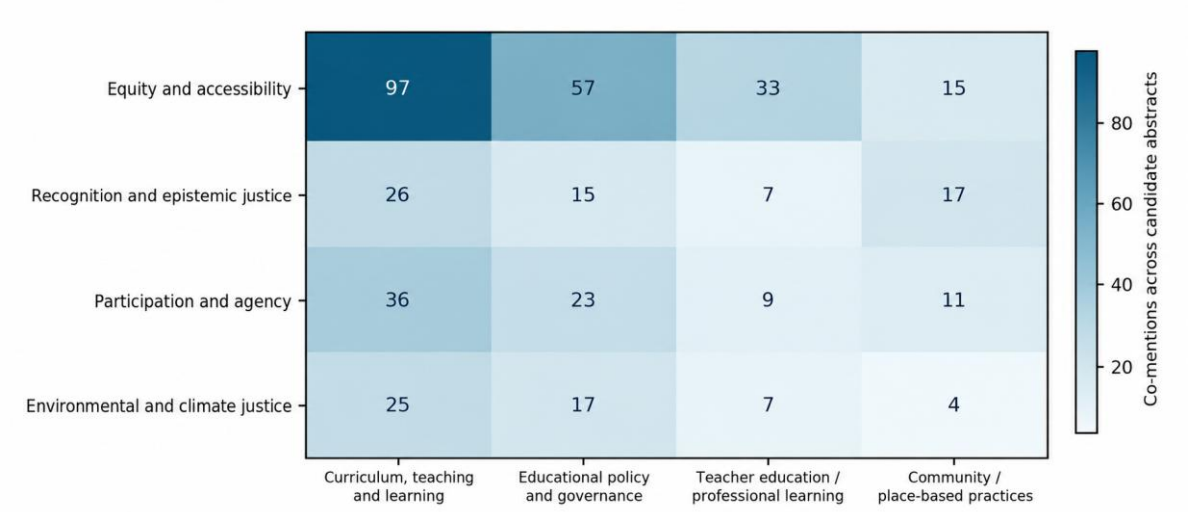


Figure 8. Lexical crosswalk between justice dimensions and educational objects in the 188 title/abstract candidates. Cells count records mentioning both sets of terms; categories are non-exclusive.

3.4. Grounding abstract-level interpretation in documented studies

A targeted reading of selected record abstracts illustrates why word co-mentions need interpretive checking. Westerman et al. (2016) examine the relationship between students' social-justice knowledge and policy attitudes in ESD, while Kopnina & Cherniak (2016) question dominant assumptions about neoliberalism, justice and pluralism. The first record reports quantitative path-model hypothesis testing; the second advances a primarily conceptual critique. Treating them as equivalent evidence of pedagogical effectiveness would be inappropriate.

Studies with more explicit practice orientations include community-based learning and student partnerships investigated by Shah et al. (2026), teaching practices reported by Rushton et al. (2026), and place-based Indigenous curriculum development described by Li and Shein (2023). These abstracts locate pedagogical process, identity and participation closer to the core analysis than generic SDG accounts. Nevertheless, neither the magnitude nor the durability of student learning outcomes can be inferred from these abstracts.

Additional heterogeneity concerns who is included and how justice is understood. de Souza (2026) examines teacher education and disability inclusion in Southern African ESD change projects; Sibanda (2026) discusses sign-bilingual education in Zimbabwe; Yılmaz (2026) outlines a curriculum framework for climate justice in primary STEM; and Droubi et al. (2023) develops a theoretical account of just-transition education. Their empirical status, study design and causal claims differ substantially. The evidence base is best described as a heterogeneous set of educational questions requiring design-sensitive synthesis rather than a single undifferentiated category of justice effects.

Table 3. Illustrative articles from the focused corpus; design and substantive focus summarized at abstract level.

Scopus publication	Type of available claim	Justice–ESD educational focus
Westerman et al. (2016)	Quantitative path-model claims	Social-justice knowledge and policy attitudes
Kopnina & Cherniak (2016)	Conceptual critique	Neoliberalism, pluralism and ecological justice
Li & Shein (2023)	Community-based education account	Place-based Indigenous curriculum and identity
Droubi et al. (2023)	Conceptual framework	Just transition, critical pedagogy and justice
Rushton et al. (2026)	Survey-based teacher perspectives	Curriculum and climate justice
Shah et al. (2026)	Mixed-methods participatory account	Equity and student–community partnerships
de Souza (2026)	Qualitative case study	Inclusive teacher education and disability
Yılmaz (2026)	Curriculum design study	Primary STEM climate-justice framework

3.5. Citation Overview scope reconciliation

A separate Scopus Citation Overview CSV supplied after the main export covers 1,521 publications and reports an h-index of 64 for that selection. Conservative title normalization matches 1,451 of those publications (95.4%) to the frozen 2,215-record analytical corpus; 70 overview entries do not match it. Consequently, the Citation Overview is treated as an independent retrieval snapshot for source consistency checks, not as a complete citation set for this study. Its h-index and annual citation totals are not transferred to the 2,215-record population. The title-level correspondence table is supplied as Supplementary Data S1.

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4. DISCUSSION

4.1. What bibliometric growth does and does not establish

The large rise in retrieved records confirms growing visibility for sustainability-oriented educational research under the search strategy used. It does not by itself demonstrate growth in sustained, justice-transformative interventions. Indeed, the full network connects ESD and social justice to higher education and SDGs, while also retaining substantial strands concerning AI and educational technology. The inclusion of these wider themes is analytically useful but warns against interpreting 2,215 as the final number of directly relevant justice-oriented ESD studies. The targeted 188-record subset makes this boundary visible instead of suppressing it.

In the reference methodological example, Wang et al. (2024) first characterized a broad research system and then examined selected studies at greater conceptual depth. The analogous discipline for SuER-02 is to preserve the separation between bibliometric retrieval, lexical screening, independent substantive eligibility and eventual full-text content analysis. The first two operations have been performed; the latter two remain a distinct possible extension beyond the current bibliometric study. This staged transparency is more informative than attaching a PRISMA-style included-study label to records not actually screened in full text.

4.2. Theoretical implications: recognition, distribution and participation

A defensible justice-sensitive interpretation distinguishes distribution (resources, access and opportunity), recognition (whose language, knowledge and experience count), participation (voice and decision authority), and environmental burden-sharing. Equity/accessibility has the highest lexical prevalence in the targeted corpus, partly because inclusion is used in many different educational senses. Less frequently mentioned recognition and environmental-justice concerns can nevertheless be conceptually consequential, as shown by discussions of Indigenous science education (Zidny et al., 2020), postcolonial education policy (Tikly, 2019) and intersectional environmental education (Maina-Okori et al., 2018).

The analysis proposes a distinction between inclusion as access to existing provision and justice as authority to question and reshape provision. This contrast is an interpretive proposition, not a validated binary recovered from all 188 abstracts. Place-based Indigenous curriculum scholarship helps explain why representation and community authority should not be reduced to enrolment measures (Li & Shein, 2023). Critical ESD accounts similarly question dominant assumptions about economic values and human–nature relations (Kopnina & Cherniak, 2016; Griffiths & Murray, 2017).

4.3. Educational practices as the bridge between justice and sustainability

The co-mention crosswalk makes pedagogical practices a logical bridge from abstract justice principles to identifiable sites of educational work. Curriculum design, teacher education and participatory learning are not interchangeable mechanisms. In a teacher-practice context, Rushton et al. (2026) distinguish knowledge-centred and community-oriented classroom approaches while questioning whether existing school arrangements sufficiently challenge colonial perspectives. In an Indigenous curriculum context, Li & Shein (2023) place Elders and community members within the design and learning process. In inclusive teacher education, de Souza (2026) situates sustainability practices against structural resource and disability-related constraints. These contrasting examples call for contextual rather than merely keyword-based comparison.

A key implication is that future ESD reviews should code whether social justice is framed as a curriculum topic, a participation principle, a design criterion, an institutional policy aim or an actual measured outcome. For example, a climate-justice curriculum framework (Yılmaz, 2026) differs from a student-response study on environmental justice (Martínez Lirola, 2018) and a philosophical framework for a just transition (Droubi et al., 2023). The distinction guards against a common analytical error: converting aspirational framework language into evidence of program effectiveness.

4.4. Measurement, design quality and interpretive limits

The exploratory method-vocabulary counts indicate diverse study designs, but they cannot support claims that qualitative, experimental or mixed methods dominate the field. Abstracts differ in how much methodological information they report; some use “mixed methods” directly, whereas others describe multiple sources without applying that label. A subsequent full-text evidence synthesis should extract sample characteristics, education level, theory use, justice operationalization, assessment measure, comparison group, follow-up interval and limitations from verified full texts. This is particularly important where the target outcome is policy attitude, epistemic inclusion, participation or climate agency, each of which demands different indicators.

For Scopus metadata, 68.31% missing indexed keywords make a DE+ID combined co-occurrence analysis potentially misleading. Restricting the networks to DE does not remove all bias: author keywords reflect strategic labeling and may be inconsistent across languages and disciplines. Network community detection is also sensitive to selected terms and thresholds, which is why all parameter choices are recorded. The 2026 partial-year effect, broad retrieval terms and exclusion of non-Scopus literature further constrain generalizability.

4.5. A research agenda consistent with SuER

The combined map supports an agenda with four empirically testable directions. First, compare ESD programs that merely increase access with programs that transfer deliberative or curricular authority to historically marginalized students and communities. Second, evaluate the conditions in which Indigenous and place-based knowledge becomes integral to

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assessment and governance rather than a symbolic curricular example. Third, examine teacher education and institutional supports that enable climate-justice pedagogy beyond individual teacher commitment. Fourth, develop outcome instruments sensitive to knowledge, identity, agency, participation and environmental responsibility, accompanied by longitudinal or comparative designs appropriate to those constructs.

For a journal centered on education and sustainability, such an agenda keeps educational practices—curriculum, pedagogy, assessment and institutional decision-making—at the analytical centre. Social justice should not be a decorative label attached to sustainable development, nor should the four lexical categories be mistaken for universally valid or mutually exclusive concepts. They are working sensitizing dimensions that should be refined by full-text evidence and critical engagement with local contexts.

4.6. Study limitations and next validation stage

This study constitutes a completed bibliometric and reproducible abstract-level lexical mapping of 2,215 Scopus records, including a more explicitly justice-oriented subset of 188 records. It does not claim to reproduce the full-text content-analysis stage undertaken by Wang et al. (2024). The researcher-supplied Scopus Q1 string is now reproduced verbatim in Appendix A; however, the raw CSV exports do not establish which file corresponds to Q1 or document a second independently executed search string. This residual provenance limitation should be resolved by confirming the second retrieval if both searches are reported. Lexical eligibility was not independently adjudicated, and co-mention statistics measure terminology, not the quality of pedagogical treatment. Accordingly, the 188 should not be interpreted as a final pool of systematically included empirical studies. A later full-text review would be needed to test the interpretive propositions and educational outcomes suggested by these results.

5. CONCLUSION

The 2,215-record Scopus corpus documents a marked expansion of research retrieved with sustainability education and justice-related terminology between 2015 and 2025. Author-keyword networks reveal intersecting strands associated with higher education, sustainable development goals, environmental education, inclusion, social justice and educational technologies. A reproducible two-concept screen isolated 188 lexical candidates, where equity/accessibility vocabulary occurs more frequently than participation, recognition or environmental/climate justice vocabulary. The contribution is not a claim that one justice dimension is intrinsically more important; rather, it is a two-level mapping approach that connects bibliometric breadth with educational questions requiring further investigation. The supplementary Citation Overview analysis reinforces the importance of distinguishing differently defined citation datasets.

DECLARATIONS

Author Contributions

Conceptualization, I.H.W.; Methodology, I.H.W.; Formal analysis, I.H.W. and M.; Investigation, M, B.G.K, and D.A.N.; Data curation, M.; Visualization, B.G.K.; Writing –original draft, D.A.N.; Writing –review & editing, I.H.W., D.A.N., and M. All authors have read and approved the final manuscript

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Competing Interests

No competing-interest statement is reported in the source manuscript.

Ethics Approval and Informed Consent

This bibliographic and abstract-based analysis did not involve primary human-participant data collection; institutional applicability should be assessed by the authors.

Data Availability Statement

The underlying retrieved Scopus metadata may be subject to access and redistribution conditions. A de-identified methodological log, codebook, network parameters, scripts and candidate-identification table are retained for audit.

Artificial Intelligence Use

Not applicable.

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REFERENCES

Al Mubarok, F. U., Inayati, N. L., Waston, & AN, A. N. (2026). Sustainability education in the global south: a neglected field? A bibliometric exploration of equity and representation. *SN Social Sciences*, *6*(7). https://doi.org/10.1007/s43545-026-01549-8

p-ISSN: XXXX-XXXX
e-ISSN: XXXX-XXXX

Aria, M., & Cuccurullo, C. (2017). Bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, *11*(4), 959–975. https://doi.org/10.1016/j.joi.2017.08.007

Chunga, J. O., Yu, H., & Kihwele, J. E. (2026). Ensuring inclusive basic education for sustainable development in Tanzania: a systematic review of the approaches and challenges. *Discover Education*, *5*(1). https://doi.org/10.1007/s44217-025-00562-y

de Souza, B. (2026). Sustainability-oriented teacher education for inclusive education in Southern Africa. *Journal of Education* (South Africa)(96), 130–145. https://doi.org/10.17159/2520-9868/I102A07

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

Droubi, S., Galamba, A., Fernandes, F. L., de Mendonça, A. A., & Heffron, R. J. (2023). Transforming education for the just transition. *Energy Research and Social Science*, *100*. https://doi.org/10.1016/j.erss.2023.103090

Fayda-Kinik, F. S. (2025). A bibliometric analysis of education for sustainable development: Critical implications for the further education and skills sector. *Education + Training*, *67*(5–6), 629–653. https://doi.org/10.1108/ET-04-2022-0163

Griffiths, M., & Murray, R. (2017). Love and social justice in learning for sustainability. *Ethics and Education*, *12*(1), 39–50. https://doi.org/10.1080/17449642.2016.1272177

Hallinger, P., & Nguyen, V.-T. (2020). Mapping the landscape and structure of research on education for sustainable development: A bibliometric review. *Sustainability*, *12*(5), Article 1947. https://doi.org/10.3390/su12051947

Kopnina, H., & Cherniak, B. (2016). Neoliberalism and justice in education for sustainable development: a call for inclusive pluralism. *Environmental Education Research*, *22*(6), 827–841. https://doi.org/10.1080/13504622.2016.1149550

Li, W.-T., & Shein, P. P. (2023). Developing sense of place through a place-based Indigenous education for sustainable development curriculum. *Environmental Education Research*, *29*(5), 692–714. https://doi.org/10.1080/13504622.2022.2098933

Maina-Okori, N. M., Koushik, J. R., & Wilson, A. (2018). Reimagining intersectionality in environmental and sustainability education: A critical literature review. *Journal of Environmental Education*, *49*(4), 286–296. https://doi.org/10.1080/00958964.2017.1364215

Martínez Lirola, M. (2018). Teaching Environmental Justice in the Framework for Education for Sustainable Development in College. *Revista Internacional de Educacion para la Justicia Social*, *7*(1), 53–68. https://doi.org/10.15366/riejs2018.7.1.003

Rushton, E. A. C., Walshe, N., & Johnston, B. J. (2026). Towards justice-oriented climate change and sustainability education: Perspectives from school teachers in England. *Curriculum Journal*, *37*(1), 7–24. https://doi.org/10.1002/curj.322

Shah, R., Preston, A., Fuller, S., & Dimova, E. (2026). Exploring equity in education for sustainable development: integrating community-based learning and teaching. *Journal of Learning Development in Higher Education*, *2026*(39). https://doi.org/10.47408/jldhe.vi39.1677

Sibanda, P. (2026). Prospects for transforming deaf education to sign bilingual education for sustainable development in Zimbabwe. *Discover Education*, *5*(1). https://doi.org/10.1007/s44217-025-00748-4

Tafese, M. B., & Kopp, E. (2025). Education for sustainable development: Analyzing research trends in higher education for sustainable development goals through bibliometric analysis. *Discover Sustainability*, *6*, Article 51. https://doi.org/10.1007/s43621-024-00711-7

Tikly, L. (2019). Education for sustainable development in Africa: a critique of regional agendas. *Asia Pacific Education Review*, *20*(2), 223–237. https://doi.org/10.1007/s12564-019-09600-5

Tosetto, P., Fernandes, P., da Silva, R. C., Gonçalves, M. C., Fisch, G., & Moraes, A. (2026). Beyond the Paradigm of Disjunction: Sustainability Education, Complex Thought, and Epistemic Justice. *Sustainability (Switzerland)*, *18*(16). https://doi.org/10.3390/su18168514

van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, *84*(2), 523–538. https://doi.org/10.1007/s11192-009-0146-3

Viviani, A. (2022). Inclusion and education for sustainable development: The experience of the University of Siena. *Perspectives in Education*, *40*(3), 132–145. https://doi.org/10.18820/2519593X/pie.v40.i3.9

Wang, S., Wang, F., Zhu, Z., Wang, J., Tran, T., & Du, Z. (2024). Artificial intelligence in education: A systematic literature review. *Expert Systems with Applications*, *252*, Article 124167. https://doi.org/10.1016/j.eswa.2024.124167

Westerman, J. H., Westerman, J. W., & Whitaker, B. G. (2016). Does social justice knowledge matter? Education for sustainable development and student attitudes. *Environment, Development and Sustainability*, *18*(2), 561–576. https://doi.org/10.1007/s10668-015-9665-7

p-ISSN: XXXX-XXXX
e-ISSN: XXXX-XXXX

Yılmaz, İ. (2026). Embedding climate justice in primary STEM education: a design-based curriculum framework for ethical and civic learning. *Frontiers in Education*, *11*. h https://doi.org/10.3389/feduc.2026.1795416

Zidny, R., Sjöström, J., & Eilks, I. (2020). A Multi-Perspective Reflection on How Indigenous Knowledge and Related Ideas Can Improve Science Education for Sustainability. *Science and Education*, *29*(1), 145–185. https://doi.org/10.1007/s11191-019-00100-x

APPENDIX A. REPRODUCIBILITY NOTES

Analytic corpus: 2,215 unique records after merging Q1 (2,176) and Q2 (383) Scopus exports dated 11 October 2026, resolving 342 overlapping Scopus EIDs and two additional duplicate-DOI records. Q2 return size was confirmed by the researcher; query strings are not embedded in the CSV files. The 188 title/abstract candidates required one ESD expression AND one justice/inclusion expression (full regular expressions are retained in the analysis script). Co-occurrence mapping used author keywords (DE), documented synonym harmonization, minimum node/edge frequencies of 9/3 for the full corpus and 4/1 for the candidate set, weighted greedy modularity and a fixed-seed layout.

A.1. Exact researcher-provided Scopus Advanced Search query (Q1)

Q1: researcher-supplied broad Boolean search associated with the 2,176-record export. The CSV format does not itself retain the executed search string.

```
TITLE-ABS-KEY ( ( "education for sustainable development" OR "education for sustainability" OR "sustainability education"
OR "sustainable development education" OR "learning for sustainability" OR "teaching for sustainability" OR "education for
sustainable futures" OR "sustainability learning" OR ( sustainab* W/3 ( educat* OR pedagog* OR curricul* OR teach* OR
learn* ) ) ) AND ( "social justice" OR "educational justice" OR "education justice" OR "social equity" OR "educational
equity" OR "education equity" OR "equity in education" OR "social equality" OR "social inequality" OR "educational
inequality" OR "educational inequalities" OR "equal educational opportunity" OR "equal opportunity" OR "inclusive education"
OR "social inclusion" OR "educational inclusion" OR "inclusive pedagogy" OR "inclusive learning" OR "social exclusion" OR
"environmental justice" OR "climate justice" OR "ecological justice" OR "distributive justice" OR "procedural justice" OR
"recognition justice" OR "participatory justice" OR "gender equality" OR "gender equity" OR "disability inclusion" OR
"disability justice" OR "racial justice" OR "racial equity" OR "indigenous education" OR "indigenous knowledge" OR
"decolonial education" OR "decolonizing education" OR "decolonising education" OR ( educat* W/3 ( equit* OR equalit* OR
inequalit* OR inclusi* OR exclusion OR accessibilit* OR marginali* ) ) OR ( ( gender OR racial OR ethnic OR socioeconomic
OR "socio-economic" OR disabilit* OR indigenous OR migrant* OR refugee* OR marginali* ) W/3 ( equit* OR equalit* OR
inequalit* OR inclusi* OR exclusion OR justice OR access* ) ) ) ) AND PUBYEAR > 2014 AND PUBYEAR < 2027 AND ( DOCTYPE ( ar
) OR DOCTYPE ( re ) ) AND SRCTYPE ( j )
```

A.2. Exact researcher-confirmed Scopus Advanced Search query (Q2)

The researcher confirmed that this focused query returned 383 documents in Scopus (11 October 2026). The 383-row file contributes 41 EID records that were not present in the broader export. The query below is reproduced verbatim; its overlap with Q1 and the final merged total are reported in Table 1.

TITLE-ABS-KEY (("education for sustainable development" OR "education for sustainability" OR "sustainability education" OR "sustainable development education" OR "learning for sustainability") AND ("social justice" OR "educational equity" OR "social inclusion" OR "inclusive education" OR "educational inequality" OR "environmental justice" OR "climate justice" OR "gender equality" OR "disability inclusion" OR "indigenous knowledge" OR "decolonial education" OR ((justice OR equity OR inequality OR inclusion) W/3 (educat* OR learn* OR teach* OR pedagog* OR curricul*))))) AND PUBYEAR > 2014 AND PUBYEAR < 2027 AND (DOCTYPE (ar) OR DOCTYPE (re)) AND SRCTYPE (j)

APPENDIX B. CITATION OVERVIEW AND DATA PROVENANCE AUDIT

Supplementary Data S1 cross-links titles in the newly supplied CitationOverview.csv (1,521 records) to the main analytical corpus by normalized title: 1,451 match and 70 do not. The Citation Overview reports h-index = 64 for its own 1,521-record set; it cannot be ascribed to the main 2,215-record corpus. Titles, EIDs, DOIs and both citation fields remain available for inspection where a match exists.

DOI-collision audit: two EID pairs shared identical title and DOI, but some Scopus rows contained incorrect source titles. For 10.1097/JTE.0000000000000426, the valid journal is Journal of Physical Therapy Education (not Operative Neurosurgery); for 10.17323/1996-7845-2018-04-06 the valid journal is International Organisations Research Journal (not International Journal of Agricultural Management). One record per verified work is retained (n = 2,215).